Remarks

The amendment to the specification corrects an inconsistency within paragraph [0042]. The amendment to the claims and new claims 30-33 are supported by the original disclosure in figures 2(b), 2(c), 2(d), 3(b) and 3(c) and the discussion at paragraphs [0034] - [0039] among other places in the specification. Applicants submit that the amendment does not add any new matter to the disclosure.

Applicants acknowledge the indication of allowability regarding claims 11 and 12. The arguments below are directed to the unallowed claims and the newly submitted claims.

The invention centers on the idea of using a non-conformal dopant material fill to form a buried plate (for a trench capacitor in a semiconductor substrate) in a sequence that involves forming the fill to an intermediate depth height below the top of the trench, forming a covering material in the trench over the dopant fill and then driving the dopant into the semiconductor substrate substrate, preferably with some oxidation of the semiconductor substrate that its interface with the dopant fill material. The invention advantageously provides a high dopant concentration in the buried plate even when the dimensions of the trench are scaled down.

Schrems et al. (US Pat. 6,200,873) discloses a process where a conformal dopant material liner is formed in the trench. The conformal nature of the material is illustrated in Figures 10a - 10d as well as Shrems et al. references to the material as "layer 177" at col. 11, line 63. Schrems et al. does not disclose or suggest a non-conformal dopant material layer, nor a layer having the geometry illustrated in the figures of the present application and claimed in new

claims 30-33. Applicants further submit that the buried plate formation method of Schrems et al. is principally that of the prior art which is indicated in the present application (paragraph [0004] to result in unacceptably low buried plate dopant concentration. Schrems et al. is concerned with forming the collar aspect of the trench capacitor and does not disclose or suggest any methods of increasing and/or preserving buried plate dopant concentration with scaling.

Mei (US Pat. 6,232,171) discloses a trench with a silicon nitride collar. Mei does not disclose or suggest the use of non-conformal dopant material fill as a basis for forming the buried plate as required in the present claims. The combination of the teachings of Schrems et al. and Mei would not result in a buried plate method where a non-conformal dopant material fill is used to form the buried plate. The combined teaching of these references would still result in a buried plate having low dopant concentration.

Tsai et al. (US Pat. 6,706,587) discloses a method of making buried plates where hemispherical silicon is used to enhance the surface area at the buried plate. Tsai et al. does not disclose or suggest the use of non-conformal dopant material fill as a basis for forming the buried plate as required in the present claims. The combination of the teachings of Schrems et al. and Tsai et al. would not result in a buried plate method where a non-conformal dopant material fill is used to form the buried plate. The combined teaching of these references would still result in a buried plate having low dopant concentration.

Kudelka et al. (US Pat. Appl. 2001/0016398) discloses the formation of a bottle-shaped trench after removal of the dopant material layer. Kudelka et al. does not disclose or suggest the use of non-conformal dopant material fill as a basis for forming the buried plate as required in the present claims. The combination of the teachings of Schrems et al. and Kudelka et al. would not

result in a buried plate method where a non-conformal dopant material fill is used to form the buried plate. The combined teaching of these references would still result in a buried plate having low dopant concentration.

Bronner et al. (US Pat. 6,177,696) discloses method of forming a buried plate using hemispherical silicon with additional doping, e.g., by gas phase, plasma, etc. Bronner et al. does not disclose or suggest the use of non-conformal dopant material fill as a basis for forming the buried plate as required in the present claims. The combination of the teachings of Schrems et al., Tsai et al. Bronner et al. would not result in a buried plate method where a non-conformal dopant material fill is used to form the buried plate. The combined teaching of these references would still result in a buried plate having low dopant concentration.

For the above reasons, applicants that the claims are patentable over the prior art of record and that the application is in condition for allowance. Such allowance is earnestly and respectfully solicited.

Respectfully submitted,
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